SCOPE OF WORK — EV 1

Project: Project Title: Evaluation of Bell Road Signal Coordination — City of Glendale

Project Goal: Evaluate the cost-benefit of the new signal timing plans implemented on Bell road from 83rd Avenue to 53rd Avenue in city of Glendale.

Proposed Approach for Task Completion:

As part of the MAG Traffic Signal Optimization Program, optimal signal timing plans are currently being developed and will soon be implemented along Bell Road by the City of Glendale. On this project, TransCore will conduct an impartial evaluation of traffic conditions along Bell Road prior to (before) and following (after) the implementation of the Lee Engineering optimal timing plans to assess the effectiveness of the timing plans and to demonstrate the benefits of traffic signal optimization.

The study area is anticipated to include Bell Road from Loop 101 to 51st Avenue, with timing plans implemented for the signal system from 83rd Avenue to 53rd Avenue. The focus of the evaluation will be on east/west travel along Bell Road through the system. Field studies to assess operations along intersecting streets to Bell Road will be limited to 59th Avenue, 75th Avenue and 83rd Avenue. The evaluation will be based on field data; that is, use of theoretical model (Synchro) output will not be a part of the evaluation. Field data will be obtained during the morning (6:30am - 8:30am), evening (4:00pm-6:00pm), and mid-day (9:00am – 11:00am) peak periods. To assure the validity of the before/after evaluation, the data collection activities should be performed within the same travel season. At this time, the travel season will reflect summer conditions when school is out and tourism/snowbird activity is reduced.

Tasks:

1. Meetings and Coordination

2. Travel Time Studies

3. Delay and Queuing Studies

4. Cost/Benefit Analysis

5. Project Documentation

Task 1: Meetings and Coordination

Two meetings are proposed for this project, one at the beginning of the project and one at the conclusion of the project. Meeting attendees will include representatives from MAG, TransCore, the City of Glendale, and Lee Engineering. The initial meeting will be held

to introduce key project participants, to set the framework for continued coordination, and to develop a mutual understanding of the project deliverables. The second meeting will be held to discuss the findings of the evaluation. This task also includes ongoing coordination between TransCore and participating jurisdictions over the course of the project.

Task 2: Travel Time Studies

The efficiency of traffic flow of travel through the Bell Road traffic signal system will be evaluated using travel time studies. The travel time studies will be conducted using the "floating car" technique, and will be performed during the peak hour of the three evaluation periods (i.e., morning peak from 6:30am to 8:30am, evening peak from 4:00pm to 6:00pm, and mid-day from 9:00am – 11:00am). TransCore will utilize two data collection vehicles during each evaluation period, one starting on either end of the study corridor. Using two vehicles will allow TransCore to obtain a minimum of four (4) travel time runs in each direction during each peak hour. The same procedure used for the before condition will be used for the after condition. The results of the before condition travel time studies will be compared to the previous MAG travel time data to determine if the data are consistent.

During each run, the travel time between the stop lines of adjacent signalized intersections will be recorded, and the time stopped at each traffic signal will also be recorded. Average travel speeds will be computed between intersections based on the travel time and distance between adjacent intersection stop lines. Stopped delays will be estimated based on the travel time data collected. Delay will be recorded when the test vehicle is traveling below 3 mph or is stopped. TransCore will summarize the data collected in tabular form for three scenarios: the before condition, the after condition, and the comparison of before/after conditions. Comparative evaluations of the before and after travel time runs would be prepared to demonstrate the improvement to traffic flow resulting from traffic signal timing improvements.

Travel time runs will be conducted for typical traffic conditions representative of the peak periods under study. Crashes or other incidents that may affect traffic operations during travel time runs will require a new run. Also, TransCore will request construction schedules from the City to ensure that the scheduling of travel time runs do not conflict with planned construction activity.

Task 3: Delay and Queuing Studies

In this task, TransCore will obtain field measurements of signalized intersection control delay at the intersections of Bell Road with 59th Avenue, 75th Avenue, and 83rd Avenue. These intersections were selected for additional analysis since they have more recurring congestion than other intersections along the study corridor. The procedure described in Appendix A of the *2000 Highway Capacity Manual* (HCM) for direct observation of vehicle-in-queue counts on a cycle-by-cycle basis will be followed to complete the studies. Control delay data will be obtained for each left-turn and through lane group on each approach to the three study intersections. Delay data for exclusive right-turn lanes will not be collected.

Using the procedure described in the 2000 HCM for high-demand intersections, two field personnel are required for each lane group studied. The study period for each lane group on an approach will be peak 15-minute period during the peak hour. Therefore, using two teams of two personnel, this data collection activity will require approximately one-hour and fifteen minutes (five person-hours) per intersection per evaluation period to allow for breaks between the data collection for each intersection approach. Three days will be required to obtain the control delay data for the referenced intersections. The data collection for the after condition will be precisely replicated according to the before condition effort (i.e., start times for each approach will be identical, and the days of data collection will be repeated (Tuesday-Tuesday, Wednesday-Wednesday).

This task does include time for TransCore personnel to gain familiarity with and practice the data collection procedure prior to actual conduct of the procedure at the study intersections.

Task 4: Benefit/Cost Analysis

TransCore will prepare a benefit/cost analysis for the traffic signal timing plan implemented by the City. This analysis will be based on the findings of Task 2 and Task 3 of this scope of work and will include the benefits of reduced travel time and reduced fuel consumption only. Because MAG does not have an established policy regarding benefit/cost analysis for travel time study efforts, TransCore will use a unit cost for travel time available from other studies prepared for other Arizona agencies. The most recent study of this type is the *SR 77 Multimodal Corridor Profile Study* for the Arizona Department of Transportation, Working Paper Number 2 (February 2004) using a composite value (cars and trucks) of $15.71 per hour for travel time. The cost of the improvement will be the cost associated with developing and implementing the new traffic signal timing plan, and will be provided by MAG and the City (i.e., additional 10% for City labor). The benefits of the signal timing plan will be computed assuming a three year project life.

Task 5: Project Documentation

A technical memorandum will be prepared that contains the data collected and summarizes the study methodology and findings. One draft and one final memorandum will be prepared. Up to eight copies of the draft and final memorandums will be produced.

PROJECT SCHEDULE — EV 1

Upon receipt of a notice to proceed, TransCore proposes to schedule the initial meeting and to complete the data collection and analysis for the before condition within a three-week time frame. Following implementation of the optimal timing plans, TransCore proposes to complete the after condition data collection within two weeks. Preparation of the draft technical memorandum will follow within two weeks of the after data collection. Upon review of the technical memorandum and discussion of the findings at a meeting of project stakeholders, TransCore will finalize the technical memorandum within one week. Submittal of the final technical memorandum will signify the completion of this project.